CHAPTER 13
TORNADOES

Wyoming, lying just west of "tornado alley," is fortunate to experience fewer intense tornadoes than its neighboring states to the east. However, tornadoes remain a significant hazard in the state. Tornadoes are the most intense storm on earth having been recorded at velocities exceeding 315 mph. The phenomena results in a destructive rotating column of air ranging in diameter from a few yards to greater than a mile, usually associated with a downward extension of cumulonimbus cloud. Tornadoes are classified by their intensity using the Fujita (F) Scale, with F0 being the least intense and the F6 being the most intense (Table 13.1).

Table 13.1 Fujita Scale of Tornado Intensity

Fujita Scale	Wind Speed	Damage
F0	40-72	Light
F1	73-112	Moderate
F2	113-157	Considerable
F3	158-206	Severe
F4	207-260	Devastating
F5	261-318	Incredible
F6	319-379	Inconceivable

According to the Wyoming Climate Atlas, the State of Wyoming ranks 25th in the number of annual tornadoes (10), 33rd in fatalities (six deaths per million people), 37th in injuries, and 36th in property damage ($49,339,505) (figure from Wyoming State Geological Survey) in the US from 1950-1994 (excerpted from the Wyoming Climate Atlas).

Tornado statistics, especially prior to the 1970s, must be viewed as incomplete since many twisters must have occurred without being witnessed. Wyoming's open rangelands experience little if any damage from these storms so many go unreported. In the 1990s, the Internet and Doppler radar increased the public's awareness of tornadoes with the potential of more being observed and reported. However, the trend in annual tornadoes has decreased by one third since 1976 and appears to have coincided with a major hemispheric weather pattern shift, despite the increased reporting based on Doppler radar vortex (circulation) signatures (excerpted from the Wyoming Climate Atlas).

History

In a database composed of information derived from the National Oceanic and Atmospheric Administration's (NOAA) National Climactic Data Center (NCDC), there were 31 recorded tornado events in Crook County between 1944 and 2009. Of the 31, 16 tornadoes have been identified as damaging. Damage is defined by those events that resulted in loss of property or life. Table 13.2, derived from the 2011 Wyoming Multi-Hazard Mitigation Plan, provides a statewide county summary of reported tornadoes including those with associated damage. Figure 13.1 shows the reported tornadoes by county. Table 13.3 shows tornadoes that actually

caused damage in Crook County between 1944 and 2009. The LEPC reported that the County had eight tornadoes during the summer of 2012, but these events did not show up in NCDC. The Crook County emergency manager suggested that tornadoes are underreported in the County due to poor Doppler coverage. A damaging tornado occurs in Crook County every 2.2 years based upon the compiled data. Fortunately there has been no loss of life from the tornadoes listed in Table 13.3. Tornadoes are most likely to occur in May and June.

Table 13.2 Wyoming Tornado Data Totals by County (1907-2006)

County	Events	Deaths	Injuries	Property Damage (USD)	Crop Damage (USD)	Total Damage (Year of Event USD)
Albany	21	0	2	77,500	0	77,500
Big Horn	23	2	2	329,500	2,750	332,250
Campbell	71	2	23	8,732,500	5,275	8,737,775
Carbon	16	0	0	27,500	277,750	305,250
Converse	37	0	12	185,800	2,750	188,550
Crook	30	0	0	648,525	308,000	956,525
Fremont	15	0	3	490,500	275	490,775
Goshen	51.3	0	26	3,023,775	27,500	3,051,275
Hot Springs	2	0	0	27,500	0	27,500
Johnson	13.5	0	0	11,050	0	11,050
Laramie	82.3	1	41	40,177,775	52,750	40,230,525
Lincoln	6	0	4	27,500	0	27,500
Natrona	31	0	9	390,500	0	390,500
Niobrara	31	0	6	854,750	100,275	955,025
Park	7	0	3	85,250	275,275	360,525
Platte	32.3	2	4	641,500	32,500	674,000
Sheridan	11.5	1	0	41,250	2,750	44,000
Sublette	2	0	0	0	0	0
Sweetwater	16	0	0	55,000	0	55,000
Teton	1	0	0	500,000	0	500,000
Uinta	2	0	0	5,500	0	5,500
Washakie	6	0	0	30,250	0	30,250
Weston	15	0	2	80,250	0	80,250
TOTAL	**523**	**6**	**123**	**56,493,675**	**1,087,850**	**57,581,525**

Table 13.3 Crook County Damaging Tornado Events: 1944-2009									
County	Location	Date	Deaths	Injuries	Estimated Property Damage	Estimated Crop Damage	Total Estimated Damage	Fujita Scale	Information
Crook		15-May-1944							A tornado was reported which resulted in considerable damage. This storm occurred during the afternoon and evening of the 17th. It began in the Black Hills Region of South Dakota and moved northwestward across the northeast portion of Crook County. Principal damage in this storm was to ranch buildings, standing timber, and considerable stored grain. Heavy rain and hail accompanying the storm resulted in may bridges and large sections of the highway being washed out. No deaths resulted from the storm, although several persons were injured, none seriously, principally by flying glass.
Crook		10-Jul-1958	0	0	0.03k	$0		0	
Crook		10-Jul-1958	0	0	0.03k	$0		0	
Crook	Southwest of Sundance	25-Jun-1959			$2,750	$27,500	$30,250		Severe thunderstorm moving north to northwest down Kara Creek with heavy rain and hail causing some damage. Tornado developed with storm for a brief period causing most of the reported property damage at one ranch.
Crook	Sundance 10 W	18-May-1961	0	0	$27,500	$0	$27,500		Tornado destroyed a barn and damaged outbuildings.
Crook	Sundance 8 S	17-Jul-1961	0	0	$275	$0	$275		A small tornado moved from west to east across a ranch destroying a shed and ripping telephone lines from poles.
Crook	Moorcroft 15 S	11-Jun-1962	0	0	$0	$2,750	$2,750		Tornado and two funnels observed but details of path not. Most damage was done by hail to grasslands.
Crook	Moskee	12-Jul-1965	0	0	$0	$275,000	$275,000		A tornado cut a swath about 0.5 mile wide and 20 miles long through the Black Hills National Forest, touching down about 4 miles southwest of Moskee and traveling easterly.
Crook		18-Jun-1967	0	0	$0	$0			
Crook		15-Jun-1972	0	0	$0	$0			
Crook	Sundance (near)	25-Jun-1975	0	0	?	?	$0		A tornado struck the Willow Springs area, causing damage to timber.
Crook	14 SE Sundance	25-Jun-1975	0	0	$500,000	C	$500,000		The tornado demolished a mobile home located 8 miles SSE of Sundance about 1715 MST. The tornado skipped northeastward at 30 mph, damaging fences, corral, and outbuildings on three ranches located approximately 7 miles ESE of Sundance
Crook		5-Jun-1976	0	0	0.03k	$0			
Crook		5-Jun-1976	0	0	0.03k	$0			
Crook	Moorcroft 19 ENE	12-Jul-1976	0	0	$27,500	$0	$27,500		A tornado struck a ranch doing damage to ranch house, outbuildings, equipment, trees and gardens.
Crook		28-Jul-1979	0	0	$0	$0			
Crook		14-Jun-1980	0	0	?	?	$0		A small tornado struck west of Hulett lifting half of the roof off a home. A lot of hail was reported causing heavy damage to the deputy sheriff's car. Crop and gardens were ruined.

Table 13.3 Crook County Damaging Tornado Events: 1944-2009									
County	Location	Date	Deaths	Injuries	Estimated Property Damage	Estimated Crop Damage	Total Estimated Damage	Fujita Scale	Information
Crook	Moorcroft	24-Jul-1982	0	0	$2,750	$2,750	$5,500	F1	A thunderstorm dumped 2.3 inches of rain in a short period of time causing local flooding. It was also spawned a tornado and marble-sized hail which left a path of destruction in the Buck Miller subdivision north of town and damaged crops in the area.
Crook	Near Moorcroft	31-May-1984	0	0	$27,500	$0	$27,500	F2	A small tornado touched down briefly, destroying a mobile home about 2 miles north of Moorcroft.
Crook		10-May-1985	0	0	$2,750	$0	$2,750	F1	A tornado demolished a small pig shed and came to within 100 feet of a ranch house. The tornado briefly lifted a cow into the air, shortly before dissipating. The cow was uninjured.
Crook	Aladdin	4-Jul-1986	0	0	$27,500	$0	$27,500	F1	A tornado at Aladdin at 1700 MST lifted the roof from a house and nearly demolished a large garage. The tornado damaged another house and knocked down several trees. About 1 mile away, it damaged a couple vehicles, ripped off a barn roof, and rearranged some haystacks.
Crook		19-May-1987	0	0	$0	$0			
Crook		19-Jun-1987	0	0	$0	$0			
Crook	22 NW Hulett	13-Aug-1993	0	0	$0	$0			A tornado downed some trees on a ranch in northwest Crook county. No injuries.
Crook	40 NW Sundance	13-Aug-1993	0	0	$0	$0			A tornado downed large trees on a ranch in northwest Crook county. No injuries or property damage.
Crook	21 N Hulett	13-Aug-1993	0	0	$0	$0			A tornado crossed a Wyoming highway in extreme northern Crook county and downed some pine trees. No injuries or property damage.
Crook	12 N Hulett	7-May-1996	0	0	10,000	$0			A tornado began on the north side of Highway 112 near Deer Creek uprooting 20 to 30 trees. The tornado moved east northeast 3 miles uprooting several large trees and destroying part of a barn.
Crook	4 S Sundance	11-Jun-1997	0	0	0	0			
Crook	9 SE Sundance	13-Jun-1998	0	0	20,000	0			Damage was sustained to a three car garage, several bam roofs, several campers, and a home satellite dish.
Crook	1 SW Aladdin	5-Jun-1999	0	0	0	0			Brief touchdown. Path width and length estimated.
Crook	6 S Alva	13-Jul-2009	0	2	300,000	0			A supercell thunderstorm developed over northern Campbell County and moved southeastward across Crook County. The storm produced very large hail across western Crook County, which caused significant damage in the New Haven and Hulett area.

Impacts

Although counties have been effected to lesser and greater extents by tornado intensity, frequency, and damage, they nevertheless have struck every county in Wyoming, thus proving to be a considerable danger. In year of event dollars, Crook County ranks 4th out of 23 counties for reported damage (Table 13.4 and Figure 13.2).

Table 13.4 Tornado Damage by County in (1907 - 2006)

County	Damage in Year of Event USD
Laramie	40,230,525
Campbell	8,737,775
Goshen	3,051,275
Crook	956,525
Niobrara	955,025
Platte	674,000
Teton	500,000
Fremont	490,775
Natrona	390,500
Park	360,525
Big Horn	332,250
Carbon	305,250
Converse	188,550
Weston	130,250
Albany	77,500
Sweetwater	55,000
Sheridan	44,000
Washakie	30,250
Lincoln	27,500
Hot Springs	27,500
Johnson	11,050
Uinta	5,500
Sublette	0
TOTAL	**57,581,525**

Table 13.5 Tornado Events by County (1907 - 2006)	
County	**Number of Events**
Laramie	82.3 (crossed 3 counties)
Campbell	71
Goshen	51.3 (crossed 3 counties)
Converse	37
Platte	32.3 (crossed 3 counties)
Natrona	31
Niobrara	31
Crook	30
Big Horn	23
Albany	21
Carbon	16
Sweetwater	16
Fremont	15
Weston	15
Johnson	13.5 (crossed 2 counties)
Sheridan	11.5 (crossed 2 counties)
Park	7
Lincoln	6
Washakie	6
Hot Springs	2
Sublette	2
Uinta	2
Teton	1
TOTAL	**523**

Future Impacts

Historical data demonstrates that the most critical area of the state for tornado hazard is the eastern one third, with the five most threatened being Laramie, Campbell, Goshen, Converse, and Platte counties. The five least threatened counties include Teton, Uinta, Sublette, Hot Springs, and Washakie (Table 13.5). Laramie, Campbell, Goshen, Crook, and Platte are the five counties that have received the most damage, while Sublette, Uinta, Johnson, Lincoln, and Hot Springs counties have sustained the least damage. Tornadoes will continue to occur in Crook County. Based upon the historic record, one will occur every 2.2 years on average. The worst case historic tornado caused $500,000 in damage in the County in 1975, or $2.15 million in 2012 dollars. This should be considered to be the low end for maximum damage from a future event.

Summary

PROPERTY AFFECTED: Medium
POPULATION AFFECTED: Medium
PROBABILITY: High
JURISDICTION AFFECTED: All